ZOOGOER

NOVEMBER • DECEMBER 1989

Friends of the National Zoo

is a nonprofit organization of individuals, families, and organizations who are interested in helping to maintain the status of the National Zoological Park as one of the world's great zoos, to foster its use for education, research, and recreation, to increase and improve its facilities and collections, and to advance the welfare of its animals.

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The National Zoological Park is located in the 3000 block of Connecticut Avenue, N.W., Washington, D.C. 20008, (202) 673-4717. Weather permitting, the Zoo is open every day except Christmas. Hours: From September 16 to April 30, grounds are open from 8:00 a.m. to 6:00 p.m.; buildings, 9:00 a.m. to 4:30 p.m.
Director: Michael H. Robinson.

Membership in FONZ entitles you and your family to many benefits–publications, discount privileges, and invitations to special programs and activities to make your zoogoing more enjoyable and educational. To join, write FONZ Membership, National Zoological Park, Washington, D.C. 20008, or call (202) 673-4960.

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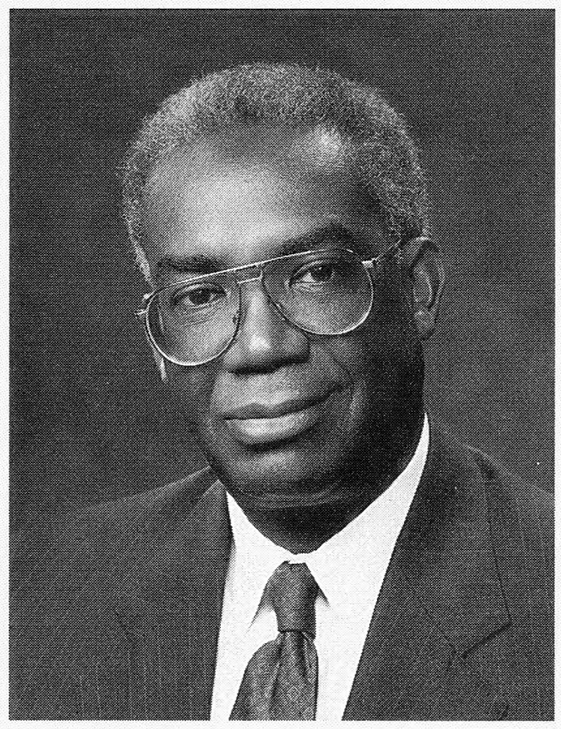
***ZooGoer* Staff**: *Publisher*: Clinton A. Fields
Editor: Susan Lumpkin
Assistant Editor: Alexa Mergen
Interns: Kathryn Barry, Melissa Thornley

Contributing Editor: Robin Meadows
Consulting Editors this issue: Robert Hoage, Natalie Marine, A. Stanley Rand.
Design: Mosser Design, Inc.

Cover: A puma (*Felis concolor*) in the wilds of Idaho. Information on healthy populations of pumas in the western U.S. and in South America (see *Frontiers*) is essential to efforts to save the endangered Florida panther. (Photo by John Seidensticker.)

Winterfest



As the holidays approach, we at FONZ are busy preparing for the first annual Winterfest at the National Zoological Park. With Winterfest, scheduled for the weekends of December 2 - 3 and 9 - 10, we hope to create a special place for community residents to enjoy the holiday season. Winterfest will include a variety of activities from a tree-lighting ceremony and twilight tours to ornament workshops and musical performances; there will even be a scavenger hunt for kids and a raffle drawing for Redskins tickets for adults.

But Winterfest is more than just a series of things to do. I believe that the Zoo, one of the most beautiful spots in Washington, is the perfect place to draw the community together in the spirit of the holiday season. And Winterfest will truly be a community event. Metropolitan-area school groups are providing musical performances. Member families, school groups, and embassies are decorating trees. Local businesses are sponsoring some of the activities. And, of course, thousands of our neighbors will learn what FONZ members already know: Winter or summer, the Zoo offers something to interest, educate, and entertain every member of our diverse community.

The holiday season is a good time to recall the essential symbiotic relationship between a community and its cherished institutions. As part of the Smithsonian Institution, the Zoo has a national character and its work an international scope. But it gives much to the local community, whose residents for 100 years have found in the Zoo a place to learn about animals, to explore the natural world with their children, and to escape briefly from the clamor of city life. In turn, the community gives much to the Zoo. From school choirs performing at Winterfest and restaurants cooking at ZooFari, to large and small businesses donating time, service, and money to Zoo and FONZ activities, to the involvement of FONZ members and volunteers—all contribute to making the Zoo a place we can be proud of.

So plan to take part in Winterfest. Celebrate the holiday season with your friends and neighbors in the beautiful Zoo you have helped to create.

Sincerely,

Clinton A. Fields
Executive Director

ZOOGOER

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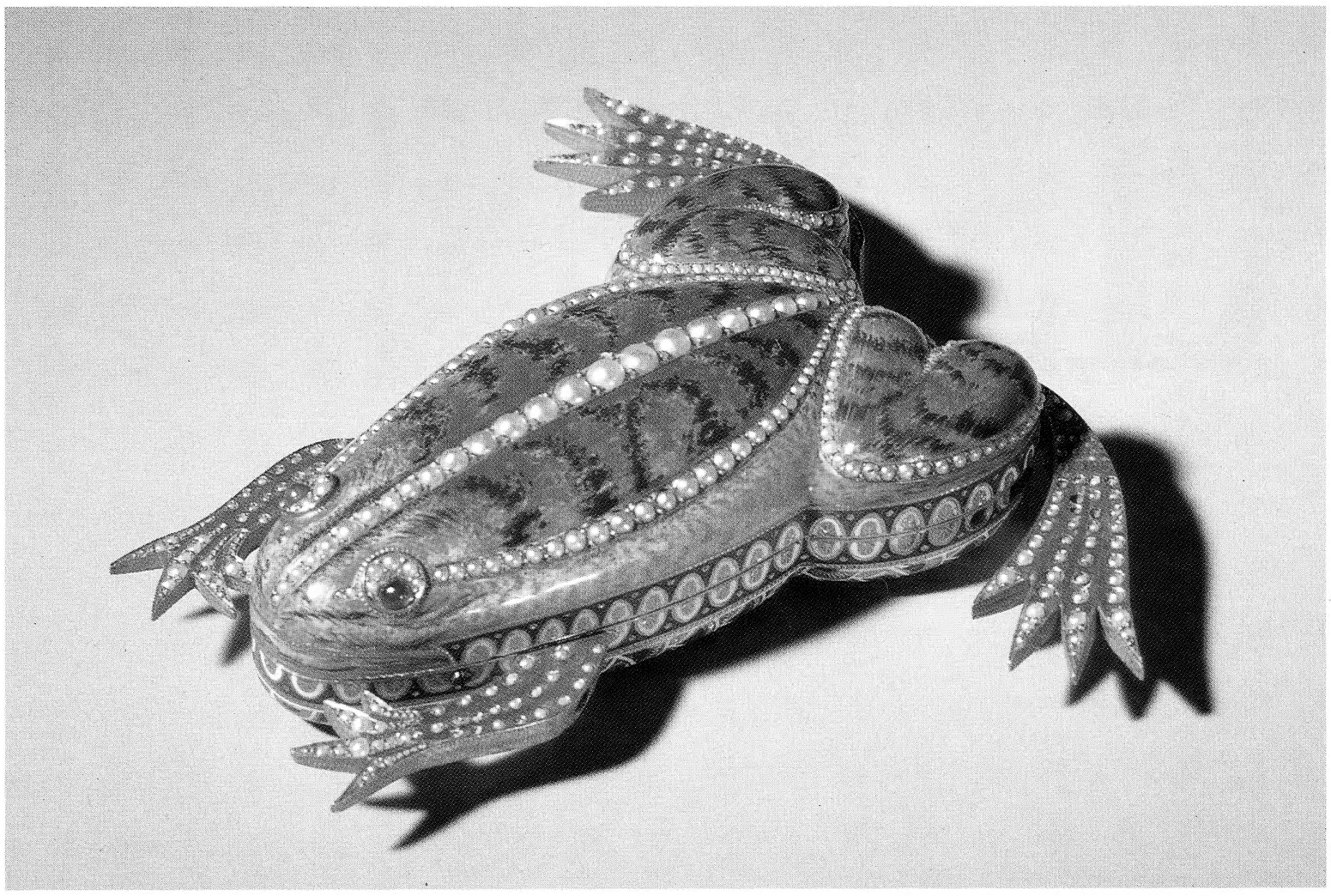


Automaton in the form of a frog. *This 19th-century Swiss automaton croaks like a frog. (Photo courtesy of The Metropolitan Museum of Art, Gift of Murtogh D. Guinness, 1976.)*

FEATURES

DEPARTMENTS

Getting To Know GRISON

FIONA SUNQUIST AND MEL SUNQUIST

Although it was only seven o'clock in the morning, we were already thirsty and hot. Around us, small eddies of wind rippled the parched golden grasses. Only a few tall palm trees interrupted the view across the vast, flat Venezuelan savanna, called *llanos*. Months of drying winds had desiccated the earth, leaving it cracked and broken. It was difficult to move quietly and we tripped and stumbled over concrete-hard clods of dried mud. And the rains which would flood over half the area were still a month away.

But the signal from the radio-collared grison was strong, telling us that the small animal was active and probably hunting nearby. Creeping forward, we followed the signal, trying to get a glimpse of what the grison was doing. Suddenly—and surprisingly close—first one, then three snake-like heads emerged from the waving grass. Noses raised, the grison peered myopically into the distance, sniffed the air, then vanished. Moments later we held our breath as they reappeared just in front of us. They moved fast, with a curious undulating trot, all three abreast, as if they were trying to flush as many animals as possible from the grass. The radio-collared female passed so close we could have reached out and picked her up. To our amazement, none of the grison paid any attention to us—none seemed to realize that we were there.

This was further confirmation of our belief that these hyperactive little hunters have rather poor eyesight. When we stood motionless and the wind was right they rarely detected us, even at very close quarters. In Uruguay some years ago, a scientist trapping small mammals watched a grison track a wild guinea pig by following its scent trail. Neither animal was aware of the other, and the grison, preoccupied with the pursuit, actually collided with the guinea pig. When hunting, grison seem to depend more on their noses than their eyes. When we encountered them on other occasions, with the wind blowing in their direction, they scented us from at least 50 feet away and quickly ran off.

Now, while we watched from about 10 feet away, the trio stopped at the base of a leaning palm tree that was entwined by a strangler fig. The female and another smaller

Little grison at the National Zoo. (Photo above by Jessie Cohen, NZP Graphics.)
Greater grison. (Photo on previous page by Fiona Sunquist.)

grison climbed the fig's trellis-like trunk, poking their noses into crevices and holes, some of which they scratched furiously sending pieces of bark and debris flying. The grison who had stayed on the ground stood on his hind legs, body flattened against the trunk of the fig, intently watching his companions' activities. He quickly checked everything that fell, pouncing on whatever looked edible. Later, apparently unsuccessful, the two in the tree climbed down headfirst, and all three trotted off through the grass.

Grison are members of the mustelid family, which includes animals such as mink, ferrets, weasels, otters, skunks, and badgers—some 67 species in all found throughout the world. The sea otter (*Enhydra lutris*), at about 60 pounds, is the largest member of the family; the two-ounce least weasel (*Mustela nivalis*) is the smallest. Grison are tropical mustelids, found only in Central and South America; their range extends from southern Mexico to Chile and Argentina. Found in both forest and open country, grison typically feed on small mammals, birds, lizards, and insects.

There are two species of grison. The smaller one weighs only two to three pounds and is known as the little grison (*Galictis cuja*). The National Zoo has three little grison on exhibit in the Forest Carnivore area. The animals we were radio-tracking in Venezuela, as part of a FONZ-supported study of the carnivore community, was the five-pound greater grison (*Galictis vittata*). Very little is known about the biology of many of the Neotropical carnivores and the grison are no exception.

Our study involved radio-tracking ocelots, crab-eating foxes, tayras, hog-nosed skunks, and grison—trying to sort out how these carnivores coexist. We were working in the flat, seasonally flooded *llanos* area of Venezuela, on a cattle ranch belonging to the Tomas Blohm family. Tomas Blohm and the National Zoo have long collaborated on wildlife studies and Smithsonian Institution scientists and students from all over the world have worked on his ranch, studying a wide variety of species from bats to opossums, anteaters to howler monkeys.

Because grison tame easily, almost everything that was previously known about their behavior came from observations of a few hand-reared animals. Grison kept in zoos are especially interesting to watch because, unlike most carnivores, they are active during the daytime. The grison at the National Zoo spend much of every morning playing, wrestling, and running in and out of burrows and holes.

In the *llanos* of Venezuela our radio-collared grison was regularly seen in the company of two others and all three hunted and rested together. We think the trio consisted of a mother and her two nearly full-grown offspring. They hunted in a variety of habitats including *llanos*, forest patches, and shrub woodlands. They also spent a lot of time in flooded rice fields where they were probably hunting rice rats.

Grison have partially webbed feet and look very at home in the water. In the Caracas Zoo we once watched three grison frolic for hours in the moat surrounding their island enclosure. They tussled with each other in the water, diving, twisting and turning, and swimming underwater like otters. Adept at finding food underwater, they zeroed in on peanuts, pieces of hot dog, and other scraps thrown into the water by onlookers.

In the wild, we found that grison often hunt in wetland areas. On the edge of a small stream, we once saw the radio-collared female catch what looked like an eel; we also found frogs in the stomachs of several road-killed grison. But cotton rats, small diurnal rats typically found in savannas, are the most common food item eaten by grison in Venezuela.

In other parts of South America, the grison is a major predator of cavies and guinea pigs, which live in a range of habitats from marshes to dry, rocky alpine meadows, as well as in savanna areas. Some of these rodents live in burrows, some make surface

Grison spend up to 12 hours a day hunting in the llanos *of Venzuala. (Photo by Fiona Sunquist.)*

tunnels between clumps of bushes, and others construct runs between dense clumps of grass. The grison's slender body and long, low, and narrow skull are well-suited to pursuing prey through thick grass and down tunnels. Because grison are so good at catching small rodents in confined spaces, some early Andean Indians tamed and kept grison as pets, using them to flush chinchillas from their burrows, much as ferrets are used in Europe to hunt rabbits.

Our radio-collared grison chose to rest in abandoned armadillo or iguana burrows, hollow logs, and tree stumps. She was fairly particular about her den sites, and on one occasion when she was searching for a place to rest for the day, we watched her disappear into a burrow and promptly reemerge. Flipping through the radio frequencies of other collared animals in the area, we discovered that the den was already occupied—by a skunk!

Our grison was on the move for 10 to 12 hours each day. Her movements were rapid and it was not unusual for her and her family to cover one or two miles in a single night's travels. Grison also range widely, and in one month the female used an almost two-square-mile area—rather large for an animal that weighs only five pounds. In fact, the grison's range equaled the range of a 20-pound female ocelot that we radio-tracked in the same area.

The three mustelid species—grison, tayra (*Eira barbara*), and hog-nosed skunk (*Conepatus semistriatus*) proved to be a study in contrast. Although we managed to radio collar only one individual of each species, all were adult females and all lived in the same area, enhancing our ability to compare them. The grison and the skunk were approximately the same size and weight, but their very different lifestyles reflected their different diets. The skunk specialized on insects, rambling slowly, digging and rooting up insects and grubs, never moving very far or very fast. With its insect food abundant, widely distributed, and easy to find, the skunk spent only about six hours a night foraging. The grison, on the other hand, roamed an area eight times larger than that of the skunk. It moved fast, traveled widely, and seemed to be constantly on the go, foraging for twice as long each day as the skunk. The grison is a much more specialized carnivore, hunting small animals that are difficult to find and catch. Watching the grison hunt was like watching a perpetual motion machine—the animal seemed to live with its foot on the gas pedal.

Although the grison is at least partially diurnal and travels widely, thus lending itself to being seen, ranchers and cowboys in Venezuela describe the grison as being rare and our experience supports this. Although we trapped for a year we never saw or caught any more than three grison in the same area. If our radio-collared female was typical, these small, slender predators need very large areas to support their specialized lifestyles and thus are unlikely to be very abundant. They are, nevertheless, an intriguing animal and our glimpses of the three grison hunting together made us wonder about the possibility of their being more social than most mustelids. Group living and cooperative hunting is uncommon in this family, but further research may show that this grison is a rare exception. ✤

Fiona Sunquist is a wildlife writer and photographer. Mel Sunquist is a wildlife ecologist at the University of Florida. The Sunquists have studied carnivore biology on three continents.

The llanos *of Venezuala. (Photo by Fiona Sunquist.)*

TAYRA TRACKING

Along with the ground-dwelling grison and hog-nosed skunk, the semi-arboreal tayra (*Eira barbara*), also a mustelid, lives on the *llanos* of Venezuela. Larger, heavier, and longer-legged than the grison, the tayra looks like a short-haired, lanky mink with a long, bushy tail. The tayra's coat is chocolate brown to black and some individuals have a gray-colored head and neck, which has given rise to the local name of '*cabeza de viejo*'(old man's head).

Native to the Neotropics, tayra are found from southern Mexico to northern Argentina. Tayra are more arboreal than grison and are not usually found outside of forested areas. In the wild, tayra are seen more frequently than grison, but this is probably because their activity is more conspicuous. Hunting mostly during the day, tayra are often mobbed by birds and monkeys as they move noisily through the forest. A. Starker Leopold encountered a group of four tayra in Mexico and was impressed by their speed and agility in the trees. In his 1959 book, *Wildlife in Mexico*, he wrote:

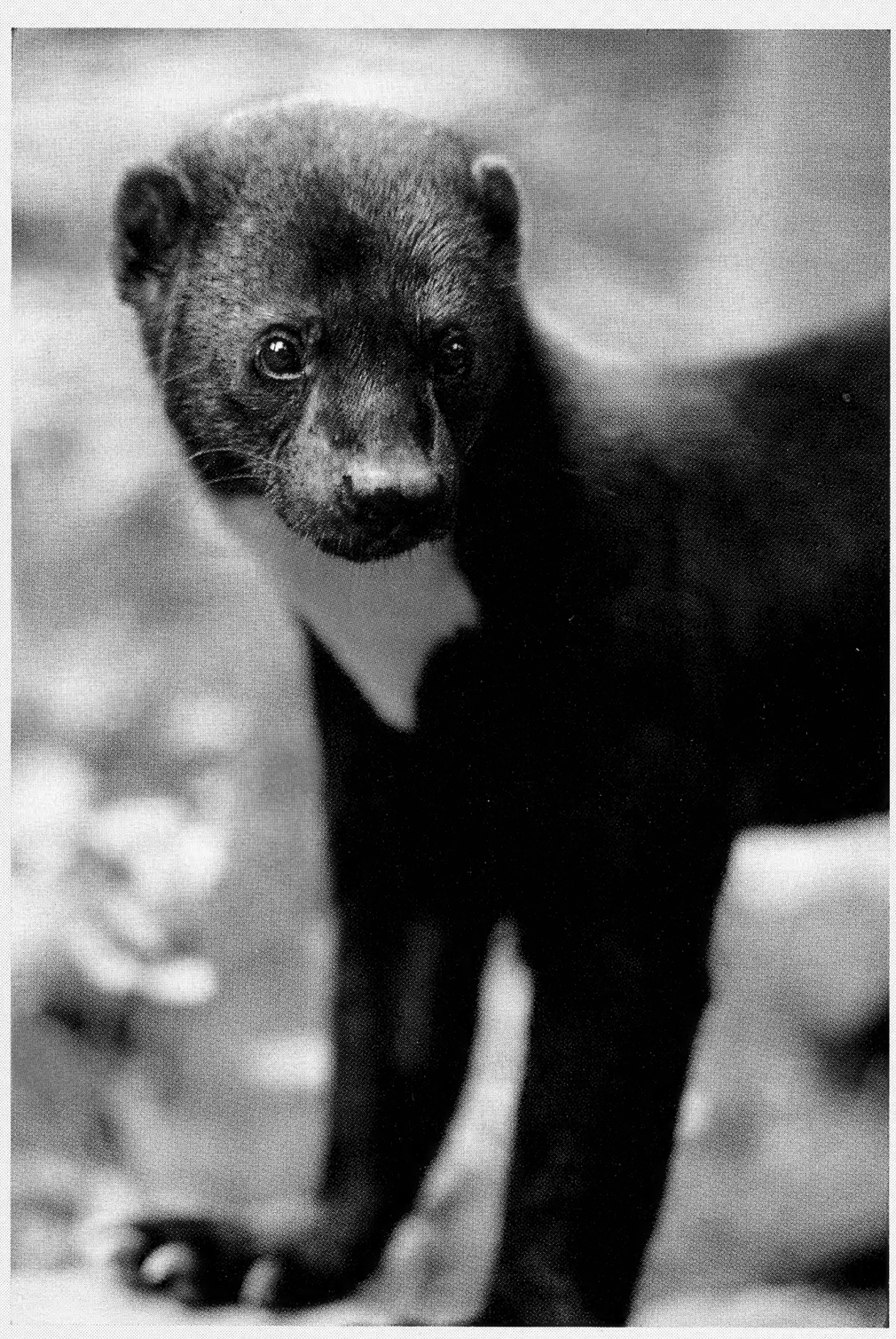
> They were spread out 10 to 30 yards apart and they moved so rapidly that it was impossible for the eye to follow all four at once. The leader leapt from the riverbank to a leaning tree trunk and in a few seconds appeared in the topmost branches, 30 feet above the river. A flash of black and it was in the adjoining tree...the other three followed in like manner springing with incredible agility up through vines and lower branches of trees..they covered over a hundred yards in much less than a minute and disappeared; but downstream I could hear the rustling and see branches and leaves shake for another minute or so before the animals were gone.

Outside of this description and a few anecdotal accounts of other brief encounters, very little else was known about the tayra's biology in the wild. So we were naturally delighted the day the ranch cowboys managed to lasso an adult female tayra. Once equipped with a radio collar, she began to provide some insights into this species' rather unusual lifestyle.

The female's diet consisted of almost equal proportions of small mammals and fruit. She spent much of her time in trees eating fruit and hunting arboreal climbing mice and spiny rats. She traveled extensively within an area of almost four square miles, often moving three to four miles each day. These extensive movements almost certainly reflect the importance of fruit in the tayra's diet, as the fruiting trees were clumped in widely scattered groves. She gave birth to two young in a hollow at the base of a tree, and for two months she reduced her movements to a smaller area around the den site. Unfortunately the young disappeared and we were unable to follow their progress to adulthood. Nevertheless, they and their mother gave us a tantalizing glimpse of tayra behavior in the wild.

While the tayra's arboreal habits, coupled with its dependency on fruit, make it unique among mustelids, they also increase its vulnerability. Their need to forage over a very large area means that the continued destruction of tropical forest habitats will put the future of this little-known predator in jeopardy.

—Fiona Sunquist and Mel Sunquist



For a closer look at these mysterious mustelids, visit the Zoo's tayra exhibit in the Forest Carnivore area. (Photo by Jessie Cohen, NZP Graphics.)

A NEW DEAL For The Zoo

KEN SCHLESSINGER

Page from a humorous rag, A Mann's Post, *conceived by Treasury-sponsored artists in March of 1934. Some of the artists who worked at the Zoo are pictured here. (NZP Archives)*

The Great Depression set Americans on edge. After the economy crashed in 1929, the disillusioned citizenry had turned to the Federal government for solutions and hope. To boost morale and provide jobs, President Roosevelt and his administration instituted a range of programs—including sponsoring artists to decorate Federal buildings with paintings and sculpture. The National Zoological Park, a branch of the Smithsonian Institution, was a major free attraction and a much-used public space, and received new buildings, sculptures, and murals through the Federal relief programs. Many of these remain in the Zoo today.

Although the Congressional appropriation for the Zoo's budget remained fairly constant during the 1930s, Federal relief programs provided the resourc-

es to upgrade and modernize the Park's buildings and grounds. The Zoo had officially opened in 1891 and many of the existing facilities were over 40 years old and in disrepair.

In 1935, a Federal grant of $680,000 provided funding for three new exhibition buildings, a machine shop, and a garage. Laborers worked at the Zoo on various small projects and a bookbinder was assigned to work at the National Zoo branch of the Smithsonian library. By 1940, Federal grants enabled the construction of a Small Mammal House, a Pachyderm House (now referred to as the Elephant House), a new restaurant, an addition to the Bird House, new maintenance buildings, the repair of drains and sewers, and the repair and construction of walkways.

These Federal programs, run by the Department of Treasury, designated a percentage of construction budgets for art work. The Treasury Department was responsible for the construction and maintenance of Federal buildings through its Public Building Service. As an extension of the program, Treasury created the Section of Fine Arts to employ artists to decorate public buildings. Treasury specified that the sponsored artists be allowed "the utmost freedom of expression." The Zoo, desperate for renovations and new buildings to house the rapidly expanding animal collection, immediately benefited. A February 21, 1934 *Washington Post* article called the Zoo "exhibit A in the list of Washington buildings being rejuvenated by unemployed artists."

Before art projects could begin at the Zoo, a committee was formed to decide which spaces were suitable for embellishment. This involved the cooperation of William Mann, the Zoo's Director, the architect of the proposed construction, and representatives from the Treasury's Division of Procurement and Section of Fine Arts, as well as Washington's Commission of Fine Arts.

Soon after the program was initiated, fund-

Prototype of a limestone bas-relief panel installed over the doors of the Elephant House in 1937. The panel was designed in 1936 by Charles R. Knight and executed by Erwin Frederich Springweiler. The panel and its companion piece remain in the Elephant House today. (NZP Archives)

ing was provided for work in the Zoo's Bird and Reptile houses. Artists supported by Treasury funds decorated the backs of the animal enclosures. Some cages in the Reptile House, for example, were painted with scenes of mangrove swamps, Hindu temples, Arizona deserts, and South American jungles. Others in the Bird and Elephant houses featured tropical plants and fruit trees.

In theory, commissions for art were awarded through blind competitions; however, the Treasury committee sometimes sought out artists it thought particularly well-suited for a project. New York artist Charles Knight, for example, was an expert in depicting both modern and prehistoric animals. He had completed private commissions for the American Museum of Natural History in New York, the Los Angeles Museum, and Chicago's Field Museum, written numerous articles, and lectured on prehistoric life. Knight had also completed one previous Treasury project, a mural at a post office in Sebring, Florida. Knight was a natural choice for the artist for the Elephant House.

The proposed Elephant House project consisted of two over-door relief panels, silhouettes on the interior walls, and floor medallions. Treasury wrote Knight offering payment of $1,840 in three installments. Although pleased with the offer, Knight hesitated to compete with other artists, and wanted to ensure artistic control if he took on the project. Treasury wrote Knight again, explaining that Director Mann had personally requested him for the project.

In the lean years of the 1930s, Knight's wife had to approach the proposal more practically. Her concerns reflect the anxieties many artists and their families shared during the Depression. Referring to art work that Knight did for another government building, she said, "The fact that he would make nothing at all out of the work was no deterrent whatever to his enthusiastic trend of thought...I found it quite necessary in this practical work-a-day world to be less idealistic in aspiration." An agreement was reached, and approval for Knight's Elephant House designs was granted in July 1936.

Knight's two over-door relief panels for the Elephant House depicted groups of prehistoric mammals. One group consisted of a *Vintatherium*, *Titanotherium*, and a woolly rhinoceros. The second group contained an American mastodon, a woolly mammoth, and a four-tusked mastodon. Metal bas-reliefs around the interior walls also depicted prehistoric animals. Floor designs were of modern mammals and included a hippopotamus, a greater one-horned rhinoceros, a white rhinoceros, an African elephant, and an Asian elephant.

Knight completed the designs in his New York studio and sent them to the Zoo to be installed. After resolving some minor questions about color and placement, Knight, the Zoo, and Treasury were satisfied. The relief panels and medallions can still be viewed today.

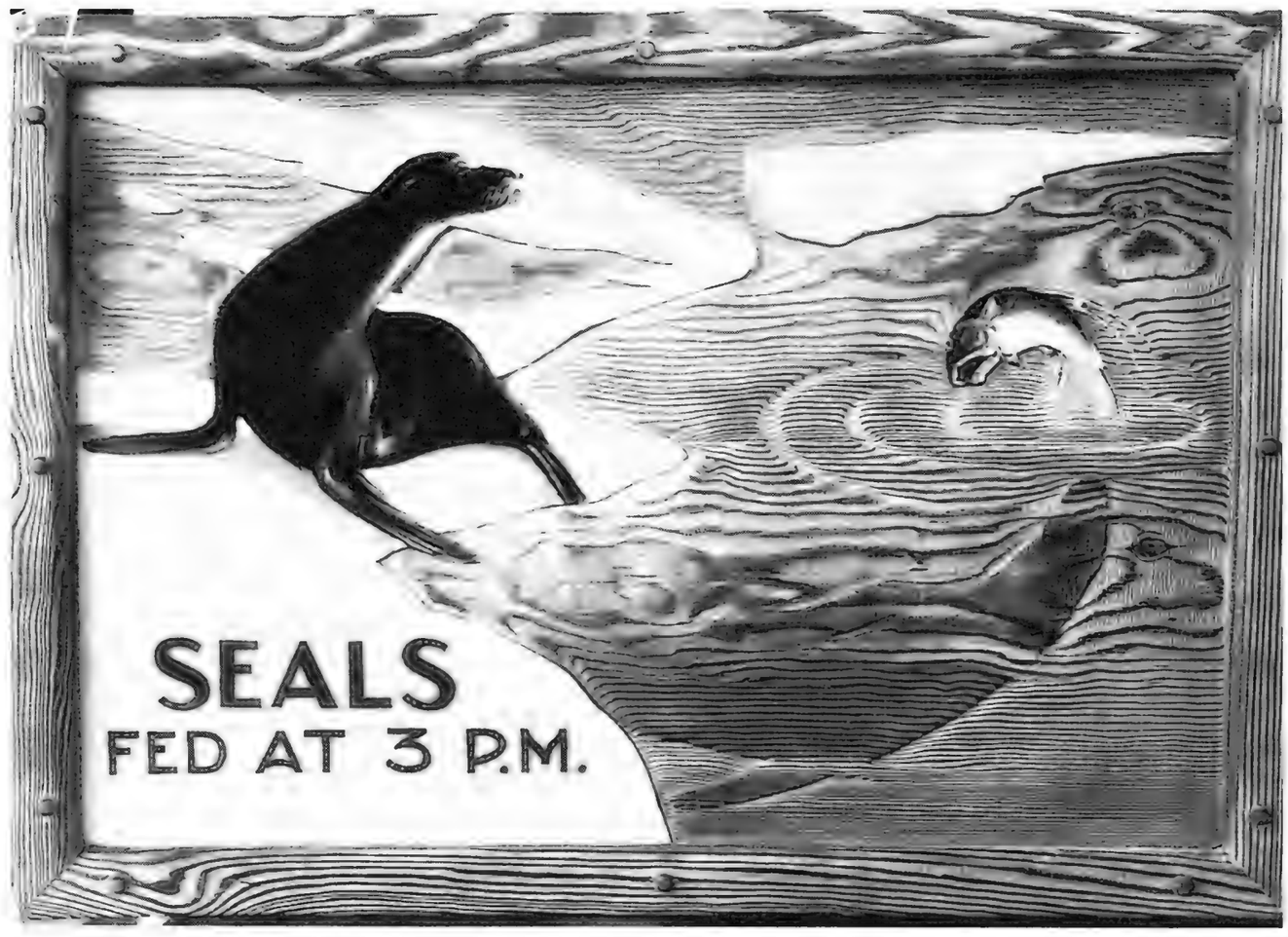
Not all artistic projects commissioned by the Federal government proceeded as smoothly. Designers of the restaurant, the last major new Zoo building of the Depression, selected Domenico Mortellito to paint murals on the interior walls. Mortellito had studied at Pratt Institute and the Newark School of Fine and Industrial Art. He had painted murals at the Morgan Library annex in New York, the Capitol Theater in Atlanta, and Yale University. He had also worked at the New York World's Fair and the Golden Gate Exposition in San Francisco through Treasury commissions.

For the Zoo restaurant, Mortellito designed a mural of animals waiting to board Noah's Ark as Noah released a flock of doves. Using a technique he had recently developed, he first carved the murals and then painted them on a linoleum surface. The surface was then covered with a special lacquer so the walls could be easily washed. Based on the amount of wall space, approximately 140 square feet, payment was fixed at $2,746.

Mortellito received the commission before the building was finished and had to work from blueprints provided by architect L.A. Simon. Friction between Simon and Mortellito soon complicated the plans. Simon complained about lack of information from Mortellito and Mortellito objected when Simon planned to drop the restaurant's ceiling by seven inches. Simon refused to revise his plans and demanded that Mortellito travel to Washington at his own expense to view the actual construction.

Simon, however, did not know that Mortellito's first payment was delayed. Artists under the Section of Fine Arts paid for supplies out of their commission, and lack of money hampered Mortellito's progress. Yet, according to the payment schedule arranged between Mortellito and the government, he could not be paid until certain stages of the project were complete. At one point, Mortellito threatened that without the necessary

Interior of the Elephant House, April 1938. "Jumbina," an African elephant, stands in front of a mural painted by an artist sponsored by a Treasury relief program. The cast-aluminum relief above the enclosure represents a woolly mammoth, one of a series of 12 pieces designed by Charles R. Knight. The reliefs, installed in 1937, can still be seen today. (NZP Archives)



Right: Klir A. Beck, a Treasury-sponsored artist, designed and built this wooden sign informing visitors of the animals' regular feeding time. This sign and many similar ones adorned the Zoo in the 1930s. (NZP Archives)

funds the mural would not be completed at all.

Finally, Mortellito did receive the money he needed to finish and install the murals, and an inspection of the work took place in September of 1940. A detail of Mortellito's mural was also exhibited at New York's Whitney Museum. Over the years, the mural deteriorated and became discolored due to oxidization; it was removed when the restaurant was remodeled in 1970. The disassembled mural is now in storage.

In 1939, the Section of Fine Arts, the only Depression-era art project not established as a limited program, was moved from the Treasury Department to the Federal Works Agency. After World War II began, the program languished as the country was overcome by new concerns.

Edward Bruce, an administrator in the Treasury art program in the 1930s, told artists, "Government art should make people's lives happier and not be solemn or intellectual." Government-sponsored commissions provided many Americans with their first encounter with original art.

Today, much of this Depression-era art remains on view in the Zoo, including: Erwin Springweiler's bronze anteater statue in front of the Small Mammal House, Heinz Warneke's red granite tumbling bears sculpture near Monkey Island, the brass and marble-chip lion and tiger medallions in the floor of the Mann Building, and, of course, Charles Knight's work in the Elephant House. The murals in the backs of enclosures in various buildings faded due to frequent washings and have long been covered over with fresh paint.

The National Zoo continues to acquire art. In the past 10 years, mosaics have been installed in the Education/Administration Building, the Auditorium, and the Elephant House. Statues have been placed near the Great Ape House, the Reptile House, the Invertebrate Exhibit, and elsewhere throughout the Park. Visitors today can see artist Steve Weitzman at work on a giant sculpture carved from a 100-year-old oak—a tribute to volunteers at the Zoo—in front of the Reptile House.

Art at the Zoo also serves the purpose of integrating society and science. Zoo Director Michael Robinson describes art as "an aesthetic response to the excitement and beauty of animals and plants—inseparable from the human experience." The Treasury Department projects started a valuable tradition of incorporating art into public spaces, like the Zoo, for education and enjoyment. ✤

Ken Schlessinger is an archivist at the National Archives and Records Administration.

Domenico Mortellito's linoleum and lacquer mural of Noah's Ark provided a rich backdrop at a retirement party for Mrs. Lucy Mann (shown here with former Zoo director Theodore H. Reed) in January 1967. The mural decorated the Zoo's restaurant from its opening in 1941 until 1970 when the building was remodeled and the mural placed in storage. At the Zoo, Mortellito also painted murals in animal enclosures, cast an aluminum bas-relief of the Pied Piper for the Small Mammal House, and carved plaques and lunettes for the Bird House. (NZP Archives)

Games Animals Play

Melissa Thornley

As you kneel behind a bush during hide-and-seek or dash to third base during softball practice, do you ever wonder if wild animals play? Although their games may seem different from the games you play with your own friends, many animals also play. You've probably seen your puppy romp around the room with a sock or your kitten chase after a piece of string. In the wild, play teaches young animals how to survive.

For a monkey in the tropical jungle or a kid in Washington, D.C., play is an important part of growing up. Human games like checkers and crossword puzzles exercise your mind; soccer and baseball build muscles. Both are fun, yet they also teach skills. For animals, play also teaches skills needed for everyday life. Running in and out of bushes and between rocks and trees, chasing other animals in circles, pouncing on sticks and tree stumps—all imitate experiences in an animal's life and let the animal practice reacting to situations in different ways. For example, the Zoo's young dorcas gazelles (*Gazella dorcas*) butt heads, kick forelegs, and push shoulders with each other—abilities they will need when they become adults and have to compete for rank.

Animals often find "toys" in their habitat. Young apes and monkeys spend hours handling rocks, sticks, and other objects they discover around them. This gives them the chance to use their hands and feet skillfully or with tools. Chimpanzees, while poking the ground—and each other—with sticks, learn to use sticks as tools. As chimps grow, they dig with the stick to find their next meal of termites and also will learn how to use a stick in self-defense.

Cats and other mammals practice their hunting skills by chasing moving objects, like a leafy branch blowing along the ground or even other animals. They wait, watch, pounce, and seize these "toys," just as they would when hunting for food. Food-gathering is a crucial part of animal life, and it takes a lot of practice for animals to become good at providing food for themselves and their young.

When a lion or tiger cub isn't feeding or sleeping, it may be rolling about with its siblings in a rough, tumbling frenzy. Through mock battle with other cubs, wild cats prepare for later confrontations with other animals over prey, mates, and territory. Speed and control over their movement will be very important when they need to escape from or pursue other animals. Stellar sea lions (*Eumetopias jubatus*), too, practice fighting skills by lunging and biting at other pups. This behavior will be used to decide which seals will be the leaders within their groups.

Instead of looking at play only as fun, it is easy to see that the play of wild animals has a purpose—survival.

Why Animals Play

Fill in the blank spaces below with the name of the young animal described.

- Last May, a Zoo lion gave birth to two ___ ___ ___ ___.
  1

- Cows and elephants usually have one young at a time, called a ___ ___ ___ ___.
  2

- Many insects, such as honeybees, hatch from eggs into ___ ___ ___ ___ ___ ___.
  3

- ___ ___ ___ ___ ___ ___ ___ ___ can recognize their mother among all other geese and line up to follow her.
  4

- Zebras and horses are closely related and both have young called ___ ___ ___ ___ ___.
  5

- Bobcats usually have three ___ ___ ___ ___ ___ ___ ___ in their litters.
  6

- In a few months, the baby bongo, born last March, will be one year old. A one-year old animal is sometimes called a ___ ___ ___ ___ ___ ___ ___ ___.
  7

Now write the numbered letters in the numbered spaces below to answer the question:

Why Do Animals Play?

___ ___ ___ ___ ___ ___ ___ ___!

4 1 7 3 6 3 5 2

Answers: *1. cubs, 2. calf, 3. larvae, 4. goslings, 5. foals, 6. kittens, 7. yearling*

A New Look for an Old Favorite

Ear-splitting jackhammers are silent, compressors no longer hiss, and tons of sandblasting dust have settled. Finally, after 14 1/2 long months—or as a collection manager of large mammals marks time, one giraffe gestation—the Elephant House has reopened.

Built as a WPA project in the mid-1930s, the building's overall appearance had faded after 50 years of hard use by its large mammal residents as well as by Zoo visitors. Reconstruction of the building's interior began in May 1988. After numerous delays, mostly associated with the simultaneous construction of Olmsted Walk (the brick pathway through the Zoo), the doors reopened on July 31, 1989.

The new design has transformed the once bleak and dreary public space of the Elephant House into a bright and pleasant spot for viewing the animals. Sunlight pours through skylights onto tropical greenery, aquatic lilies, a fish pool and waterfall, and succulent plants surrounding desert palms. Dense vegetation cascades down the walls behind the pygmy hippos.

The brightened interior highlights original artwork. Look up to see renowned artist Charles Knight's aluminum reliefs of prehistoric mammals and down to see Knight's floor medallions representing some of the House's current residents. A new mural, "Crossing the Flats" by Mark Hallett, of the dinosaur *Mamenchisaurus hochuanensis* hangs above the hippo enclosure. Ceramic mosaics donated by local high school artists are displayed along the railings.

Two raised platforms improve visitors' views of the animals. An African-style hut at the west end of the building provides a platform for a closer look at the giraffes. From the east-end riser, you can actually count the teeth in the mouth of a yawning Nile hippo.

The same species are still on exhibit—African and Asian elephants, Masai giraffes, pygmy and Nile hippos, and greater one-horned rhinoceros—although a few individual animals have moved to other zoos around the world to make room for new Zoo babies.

The most significant change in the animal collection during the renovation was the integration of the African and Asian elephants into a harmonious social group. Since the new herd's formation in August 1988, our elephant management program has changed profoundly. Once a nervous and unpredictable animal, Nancy, our 35-year-old African elephant, has relaxed and become a confident matriarch as a result of natural social interaction with the other elephants. Calm and dependable, she now leads daily training demonstrations for visitors. In addition, the elephants participated in three public education programs each day last summer, including "Elephant Encounter," a close-up look-and-touch interaction between visitors and Shanthi, the youngest elephant. All three elephants also donate blood twice a week—their contribution to an elephant health-care program and research on elephant reproduction. Most importantly, however, is that for the first time in Zoo history, the elephants are unchained and have unrestricted access to the outside yard at night.

Interior of the renovated Elephant House. (Photo by Jessie Cohen, NZP Graphics.)

Our plans for future improvements include converting the now-vacant African elephant exhibit into a grasslands habitat for the greater one-horned rhinoceros; introducing free-ranging tamarins to climb through the dense foliage above the pygmy hippos; and, funding permitting, developing an interactive educational display about giant animals to enrich the visitor's experience.

And, perhaps, if the future of the animal breeding programs are as bright as the new decor, you may eventually see giraffe, pygmy hippo, and even greater one-horned rhino babies living in the Zoo's Elephant House.

—John Lehnhardt
NZP Collection Manager

Aquaculture

This winter visitors to the National Zoo can see the colorful world of the Great Barrier Reef. About 15 species of fish, from the dazzling blue devil damsel fish to the elegant black-and-white striped bannerfish, will swim among a simulated natural reef environment. The 2,000 gallon "Great Barrier Reef" tank will be the Zoo's first coral reef fish exhibit and the first exhibit to open in the Australia Pavilion (formerly Delicate Hoof building). As the reef exhibit becomes biologically balanced within the first year, we hope to expand the number of fish species to about 35. Later, we will include a variety of marine invertebrates such as the Pacific spiny lobster and the long-tentacled carpet anemone in this amazing aquaculture endeavor. The exhibit is partially funded by proceeds from the 1988 ZooFari which celebrated the diversity of Australian wildlife.

—Ed Bronikowski
NZP Collection Manager

The Songs Of Frogs

MARIANNE HUGHES

Taking a walk down a little-traveled country road in springtime is probably not the best way to find a few minutes of silence. Especially on a rainy day or at dusk, the air is filled with a raucous assortment of trills, croaks, and screams—frogs, recently emerged from winter hibernation, are preparing to breed. Perhaps listening to such an orchestra was the inspiration for the early 20th-century herpetologist Mary C. Dickerson's remark, "Frogs feel physical joy and express it in song."

The vertebrate class Amphibia includes frogs (and toads, actually considered frogs by herpetologists), salamanders, and caecilians, a little-known tropical group whose members look somewhat like oversized earthworms. All amphibians have in common smooth skin without feathers or hair and the ability to breathe on land. Furthermore, although they have no obvious external ears such as most mammals have, amphibians have ears and are able to hear. Fossil amphibians from about 200 million years ago have middle-ear structures remarkably similar to those of modern species, indicating that hearing may be an ancient phenomenon in this class of vertebrates.

Male bullfrogs use calls to attract mates.

(Photo by Jessie Cohen, NZP Graphics.)

Although all amphibians can hear, perhaps not all are able to make sounds as well. But herpetologists

have recorded vocalizations of at least a few species in each group, including caecilians. As recently as 20 years ago, these legless, burrowing amphibians were believed to be silent. The first recording of caecilian sound production was made as the result of an accident. In 1977, a caecilian was discovered in a collection of snakes shipped into the United States from Colombia. It had apparently been mistaken for a snake by its collector. When it

Vocalizations vary among frog species: White's tree frog screeches. (Photo by Jessie Cohen, NZP Graphics.)

was separated from the snakes and put into a cage by itself, the captive began exploring, making clicking sounds that could be heard for about 10 feet. Since then, similar clicks have been recorded from captive individuals of four species. (Approximately 60 species of caecilians are known.) Like the sounds made by echolocating bats, these clicks may have an orientation function, helping caecilians find their way through burrows in the tropical forest floor.

Sound production is more widespread in the salamanders, and seems to play a role in defense. These little amphibians, which are often mistaken for lizards, may be found in or around ponds and streams or in damp regions of the forest floor. When threatened by a predator, such as a shrew, many salamanders will assume a defensive posture with the legs stiffened, the tail curled back over the body and waving, and the mouth open. As the predator approaches, the salamander lunges forward with a startlingly loud bark or squeak. The combination of aggressive posture and sudden noise will often confuse the predator momentarily, giving the otherwise helpless salamander a chance to escape.

There are also some clues that salamanders may communicate with one another through vocalization. In a group of captive spotted salamanders (*Ambystoma maculatum*), for example, courting males and females called while approaching one another, making clicking sounds that were audible 15 feet away. These sounds were never heard outside the breeding season. And captive northwestern salamanders (*Ambystoma gracile*) made similar noises when given a meal of fresh earthworms. In this case, the largest male's vocalizations caused smaller individuals to hesitate while he grabbed the food.

Observations of salamanders in captivity thus hint that at least a limited amount of vocal communication takes place in these amphibians in nature. It is only in frogs and toads, however, that vocal communication has evolved to a level of complexity rivaling that found in some birds and mammals. Why should this not be so for caecilians and salamanders? One hypothesis links vocalization with jumping as a way of moving from place to place. Because frogs jump, they do not move in a continuous path across the ground. Consequently, the chemical trails that serve to advertise the presence of many animals to prospective mates would be of little use to frogs. According to this hypothesis, jumping as a means of locomotion and the ability to make and receive complex vocal signals probably evolved together.

Frogs make sounds the same way humans do—by passing air from the lungs over vocal cords encased in the muscular larynx or "voice box" between the lungs and the mouth. As air moves over the vocal cords it causes them to vibrate. The vibration of the vocal cords makes the sound; the degree to which the vocal cords are tightened by the laryngeal muscles determines the pitch, or frequency, of the sound. In addition, male frogs have vocal sacs, inflatable flaps of loose skin located beside or beneath the throat. The vocal sacs act as air reservoirs and radiate sound. The presence of vocal sacs may explain how the pickerel frog (*Rana palustris*), which has a body length of less than three inches, can produce calls with a volume of 110 decibels—about as loud as a jackhammer.

Using a combination of surprisingly simple equipment and clever scientific detective work, herpetologists have been able to discover some of the functions of frogs' calls. The basic "playback" experiment consists of recording the vocalizations of a single frog, either in the field or in the laboratory. The calls can then be played back to other frogs under controlled conditions and their effects on the listeners observed. Taped calls can also be manipulated. For instance, the loudness, repetition rate, and arrangement of notes can all be systematically varied. Watching how frogs respond to these synthesized calls provides clues about the specific aspects of the call that elicit a response.

From results of playback experiments conducted among a number of species, the most common vocalization of male frogs has been named the advertisement call. This is the call that is heard constantly during the breeding season and, as the name implies, it advertises the presence of the calling male. Both male and female frogs of the same species will respond to a male's advertisement call, but in very different ways. A female ready to mate will be attracted by the call and approach the calling male. A male may respond by making his own advertisement call or by moving further away from the calling male. Or he may approach the calling male and initiate a wrestling match in which the two grapple and push one another with their heads and front feet.

The calls of only a small fraction of the more than 2,500 existing species of frogs and toads have been recorded and analyzed. But the evidence indicates that there is considerable variation in call characteristics even among very similar species. In fact, an experienced herpetologist can often identify many species simply by listening to their calls. However, within a given species, calls of different individuals are so similar that finding any variation at all may require sensitive electronic equipment. This poses an interesting evolutionary question. With only rare exceptions, most frogs never see their parents. Therefore, unlike many birds and mammals, they spend no early period with their parents during which they are exposed to vocalizations of members of their own species. So how do frogs know how to make and respond to calls characteristic of their species while ignoring those of other species?

Between-species hybrids help answer

part of this question. Between-species hybrids can be considered the result of a case of mistaken identity. When individuals of two different species mate, even slight differences between the chromosomes contributed by each are often enough to prevent normal development of embryos, and no offspring result. In cases where hybrid offspring are born, they are often sterile. (The best-known example of a between-species hybrid is probably the mule, the sterile offspring of a horse and a donkey.) Between-species hybrids are rare in nature, but a few examples have been discovered among tree frogs in the southeastern United States. These little frogs, which include several species, are similar in size and color and have somewhat similar trilling calls. The species identity of an individual may elude even an experienced collector—and sometimes, apparently, may elude another frog. In southern swamps, males of three or four species call within a few yards of one another. As it turns out, the calls of tree frog hybrids are intermediate between the calls of their two parental species, with some components of each. This is what would be expected if there is a strong hereditary component to calling—that is, if the genetic material from each parent provides the embryo with a "blueprint" of its species' own call.

However interesting the insights they provide, hybrid tree frogs amount to only two or three individuals in a population numbering in the thousands. Most of the time, male and female frogs respond only to calling males of their own species, while appearing oblivious to half a dozen other species' calls.

Experiments aimed at discovering how a response can be so specific are not simple. They require highly sophisticated electronic equipment that can determine exactly what kinds of sounds will stimulate the frog's auditory nerve (the nerve that carries information from the ear to the brain). They also demand a very skillful—and very patient—investigator. These experiments have resulted in some of the most important insights in the field of acoustic communication. They have shown that frogs are incredibly selective in the sounds they respond to—so selective that they actually do not hear noises, no matter how loud, unless the noises contain certain key frequencies, or pitches. The pitches that cause a response are the same ones that occur in typical calls of the frog's own species. For example, the advertisement call of a male bullfrog (*Rana catesbeiana*) contains components of three different pitches, like a three-note chord. Bullfrogs of both sexes are highly responsive to artificially synthesized sounds having the three pitches, and relatively unresponsive to sounds of other pitches. Cricket frogs (*Acris crepitans*) carry their selectivity even further. The advertisement calls of male cricket frogs from New Jersey are slightly higher in pitch than those of males from South Dakota, though the two populations belong to the same species. But female cricket frogs from New Jersey do not respond to the calls of South Dakota males, nor do South Dakota females respond to New Jersey males' calls.

Although male advertisement calls have been studied most intensively, other calls have been recorded in some frog species. Among the European midwife toad (*Alytes obstetricans*), the male makes his advertisement call from a burrow in the ground and the female answers with calls of her own as she approaches the burrow. Female *Tomodactylus* toads from Mexico call during courtship. These little toads, only about an inch long, are often found around extinct volcanoes. Reciprocal calling may help males and females find one another on the complex terrain of a lava bed. In Australia, both sexes of White's tree frog (*Litoria caerulea*) make a piercing, cat-like scream when disturbed.

Despite a limited vocabulary of calls, frogs can communicate in some surprisingly complex ways. Male bullfrogs, for example, form choruses. These choruses, which may consist of dozens of calling males, attract females to suitable egg-laying habitat and to males that will fertilize their eggs. Within a chorus, neighboring males arrange themselves into groups of two or three and call alternately within their groups. By alternating calls, a male is not politely offering other group members a turn. He is waiting for his own chance to call without interference from his neighbors. If his calls are more attractive to females than are his neighbors' calls, the wait is worthwhile.

Perhaps the most striking example of complexity in communication comes from the túngara frog (*Physalaemus pustulosus*), the object of a study conducted at the Smithsonian Tropical Research Institute in Panama. Túngara frogs breed during the wet season (April-December); although males call every night, females arrive only when they are ready to mate, so males are intensely competitive. Male túngara frogs' advertisement calls consist of two components: a "whine" followed by one or more "chucks." A male calling alone may follow a whine with only one chuck. But as the number of calling males increases, so does the number of chucks in each male's call.

Playback experiments revealed that female túngara frogs are attracted to more complex calls—when two different advertisement calls are played simultaneously, most females will approach the speaker broadcasting the call that has more chucks. Females also prefer lower-pitched chucks. By increasing the number of chucks in his call, a male gives females ample opportunity to compare his calls with those of his rivals, and increases the likelihood that he will be approached by a female ready to mate. However, female túngara frogs are not the only individuals attracted by the advertisement calls. The frog-eating bat (*Trachops cirrhosus*) and possibly the marine toad (*Bufo marinus*) also use túngara frogs' advertisement calls—as a means of locating a meal. For the túngara frog, attracting females can be risky.

Scientists may never know whether frog songs express physical joy—but studies of frog vocalization continue to reveal how songs help frogs survive. ✤

Marianne Hughes is completing her doctorate in animal behavior.

Male túngara frogs use calls to compete for mates. (Photo by Jessie Cohen, NZP Graphics.)

FONZ News

At the October 19th Annual Meeting of the Friends of the National Zoo, William H. Berman, Miriam A. Carmack, and Anne Shultz were elected to first terms on the FONZ Board of Directors and Josephine T. Burman, George A. Didden, III, and Kenneth R. Sparks were re-elected to serve third terms on the Board. George A. Didden, III, was also elected to his third term as President of the Board of the Directors. Other officers are: Kenneth R. Sparks, First Vice President; Ine N. Noe, Second Vice President; Richard D. Buckner, Treasurer; and Elizabeth B. Frazier, Secretary.

FONZ wishes to thank departing Board Members Knox Banner, Terry Peel, and Nancy Schneck for their nine years of service. FONZ is also pleased to announce that James Schroeder was appointed to the position of Deputy Executive Director in August.

Winterfest

Plan to celebrate the winter holidays at the first annual National Zoological Park Winterfest. FONZ members are invited to get into the holiday spirit by decorating a tree along the Zoo's Olmsted Walk on the afternoon of December 2 and then participating in a host of other holiday activities at the Zoo. December 2 events include a twilight tree-lighting ceremony and open house along Olmsted Walk followed by a reception and concert in the Education Building.

Other events, scheduled for December 3 and December 9 and 10, include choirs and instrumental music in decorated animal houses; nightly tours of Olmsted Walk; children's scavenger hunts; decorations workshops; celebrity story telling; lectures and book signings; and a raffle for prizes including a pair of tickets, air fare, and hotel accommodations for the December 17 Redskins at Atlanta game.

For holiday shopping, the Zoo Bookstore will be open from 10:00 a.m. to 8:00 p.m. and a special children's gift-buying center, The Reindeer Room, will be open in the Education Building classrooms. For more information, see the October/November *Wildlife Adventures* or call 673-4960.

New at the Zoo

Noteworthy recent births at the Zoo were those of tayra (*Eira barbara*) on September 10 and small-clawed otters (*Aonyx cinerea*) on August 22. These animals seldom breed successfully in zoos and, as with many other small carnivores, new mothers and young must be left strictly alone. As a result it will be some time before the sex—or even the number—of young is known. Other new Zoo babies include a female pot-bellied pig (*Sus scrofa*) and a colobus monkey (*Colobus guereza*).

As part of the developing Australia exhibit, the Zoo has also acquired a pair of western gray kangaroos (*Macropus fuliginosus*) and three dama wallabies (*Macropus eugenii*), which can be seen in their grassy exhibit behind the former Delicate Hoofed Stock building.

Prehistoric Art

Upcoming evening lectures include "Human-Animal Relationships as Depicted in Prehistoric Art" on December 12 at 8:00 p.m. About 34,000 years ago, people in Europe, Asia, Australia, and Africa began carving and drawing representations of animals. Most often depicted were herbivorous mammals, but birds, carnivores, reptiles, fish, and fantastic beasts are also seen. Lecturer Alison Brooks of the Smithsonian's National Museum of Natural History will discuss the various roles this art might have played in prehistoric life. Admission is $3.00. For ticket information, see the October/November *Wildlife Adventures* or call 673-4960.

Bear Essentials

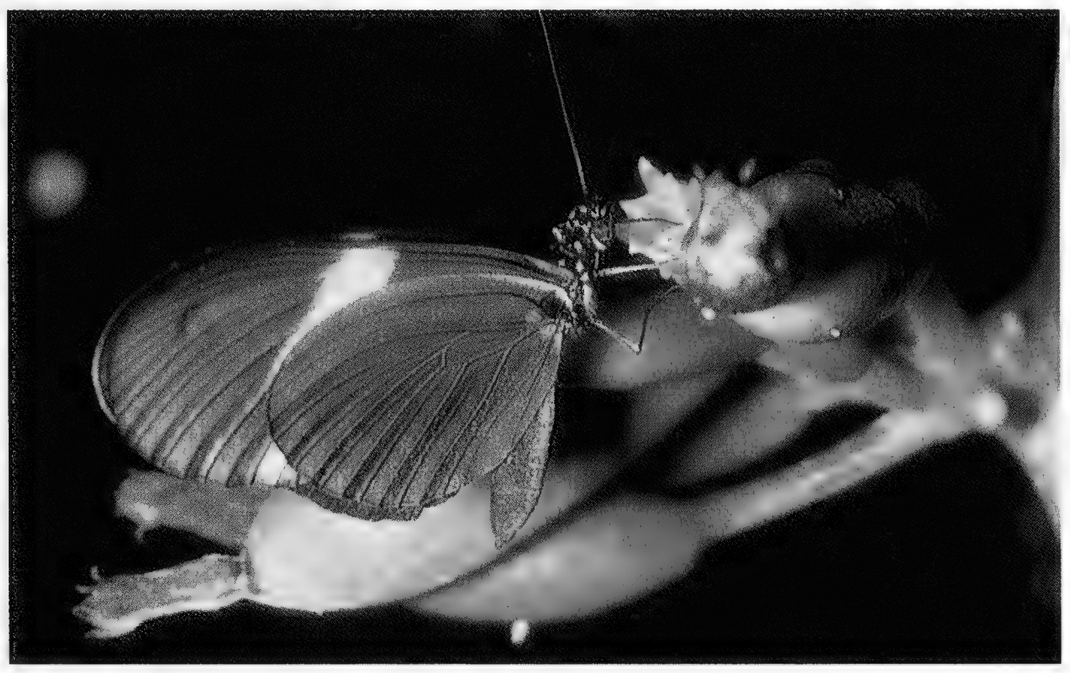
No matter how cold it gets this winter, residents of the Zoo's upper bear exhibits will be enjoying their recently renovated enclosures. The bears now have soft substrates planted with vegetation native to their natural habitats; they can forage with their claws and snouts as they would in the wild. The black bear, Smokey, has sod planted with wild flowers, mulch to forage in, and a shelter lined with hay. The brown bear, Kiska, has sod planted with wild flowers, tree saplings, and winter rye. The wooden shelter that Smokey "hibernated" in last year has been moved to Kiska's enclosure. (Technically, bears do not hibernate; they go into a winter lethargy.) Zoo staff hope that both bears will spend the winter on exhibit, where they are less susceptible to disturbances from noise within the building, and visitors can see them better. Occasionally, the bears will wake up and move around. Although keepers offer them food every other day, the bears rarely eat much until March or April when they fully awake.

The sloth bears now have sod planted with day lilies and drilled logs filled with mealworms for them to claw and snuffle. The spectacled bears remain in the lower bear exhibit. Zoo staff are hoping for the births of sloth bear and spectacled bear cubs this December.

A Passion for Butterflies

An eye-pleasing experiment by Marty Condon, a FONZ-supported scientist, is attracting visitors in the Reptile House like bright flowers bursting with nectar attract butterflies. And butterflies and blossoms are precisely the focus of the experiment. In the Reptile House, Condon has installed an exhibit featuring passion vine butterflies (*Heliconius erato*), progeny of adults she brought back from a study trip to Central America. In the wild, these black, red, and yellow butterflies live at the edges of tropical forests where their major food sources—passion vine shoots and flower nectar—are abundant. Condon explains that behind the display lies an intricate relationship between the passion vine butterfly and the plants that sustain them throughout their lives.

Looking at the Reptile



Heliconius erato *(Photo by Marty Condon.)*

Notes & News

House display you see a gregarious group of butterflies flitting around the plants. A closer look reveals the insects' life cycle: mating, egg-laying, and feeding behaviors are all readily observable. Females flutter to tender new shoots of the passion vine to deposit eggs. Mature butterflies alight on the bright red and orange flowers to gather pollen and energy-rich nectar.

In the butterflies' tropical forest habitat and even in the deceptively peaceful-looking exhibit, a struggle for survival is under way. Look carefully at the plants and you'll begin to see how nature has armed the participants for the battle. Anyone who has gardened knows that butterfly caterpillars can eat vast quantities of leaves very quickly. Some plants, including those in the exhibit, have evolved defense mechanisms to protect themselves against the caterpillars. For instance, some species of passion vines, the sole food of the *Heliconius* caterpillar, have tiny nectaries on the underside of their leaves. The nectaries produce sugar water, which attracts ants and wasps. The ants and wasps, in their turn, feed upon the *Heliconius* caterpillars. This helps check the caterpillar population which, if left to its own devices, could devour the passion vine. Other passion vines have an even more active defense in their arsenal: They have evolved hooked hairs that puncture young caterpillars. Caterpillars are holding their own in this evolutionary battle, though: Some species spin a web over these puncturing hairs and continue their passion vine repast unharmed.

Not surprisingly, reproducing a slice of tropical forest in the Reptile House presents a few problems. Condon explains that the number of butterflies in the exhibit depends on the availability of flowers and shoots for the butterflies to feed upon. *Heliconius* also feed on the pollen of these plants—a feature that distinguishes them from all other butterflies. She has collected some of these food plants in the tropics and brought them into the U.S. with special permits; others she grows from commercially available seeds. But even the sunny work area on the second floor of the Reptile House does not provide the sunlight necessary to produce enough plants to support a large number of butterflies.

Insect pests are another problem. Lantana, with its firework-like bursts of flowers, is a favorite food plant of these butterflies. Unfortunately for Condon, who is trying to grow lantana, it is also a special favorite of aphid-like whiteflies. They devour large amounts of lantana, reducing the quantity available to the butterflies. So Condon has introduced natural parasites of the whitefly—tiny wasps about the size of a dot over "i"—to see if she can reduce the number of whiteflies.

Rearing the insects from egg to butterfly is a project unto itself. With the help of Karen Klein, a FONZ intern, Condon collects the tiny butterfly eggs from the exhibit and places them in small, covered plastic containers. Condon and Klein add tendrils of the passion vine for food and a small tuft of moistened cotton to keep humidity high. Once the eggs hatch, Condon and Klein clean the containers and keep them supplied with passion vine shoots. The feeding and cleaning chores require three to four hours of their time daily.

While Condon continues her study of these colorful insects, the attractive exhibit provides a lesson in ecology for anyone willing to spend a few moments watching the intricate activities. A living example of the interrelationship between plants and animals, the exhibit illustrates the delicate balance that nature maintains in even a small patch of tropical forest.

—Margie Gibson
NZP Staff Writer

Letters

Bilingual Bats

I thought that you might be happy to know that I gave a copy of the July/August 1989 *ZooGoer* issue on bats to Wang Yani, the young Chinese artist who currently has an exhibition at the Sackler Gallery. The issue passed an international test—without being able to read it, she was nonetheless delighted.

—Jan Stuart
Arthur M. Sackler Gallery
Smithsonian Institution
Washington, D.C.

Dream On

In the three years that I have been a FONZ member, I've seen *ZooGoer* evolve into a very attractive, interesting, and informative magazine which is a pleasure to see and to read. Inevitably, every issue includes something which makes me want to visit the Zoo yet again. I'm writing to let you know that I think the July/August 1989 issue is one of the best yet.

I particularly enjoyed "The Art of Dreaming." As do many Americans these days, my husband and I have a great interest in things Australian. Ms. Weinberg's account of the Aborigine's connectivity with their animal Ancestors, the Genesis-like creation myth of Dreamtime, and the efforts of Aboriginal artists to reenact their Ancestors' primeval journeys was fascinating. And the artwork illustrating the article is gorgeous.

Thank you so much for the improved *ZooGoer*. I look forward with great anticipation to further issues.

—Catherine Lewczyk
Washington, D.C.

Bear Facts

Your interesting history of the National Zoo in the May/June 1989 issue of *ZooGoer* aroused numerous memories: associations with Bill Mann and Ted Reed; lunch at the Zoo restaurant with the Anteater's Club; numerous visits to the Zoo with my children and grandchildren; long-time membership in FONZ.

I had a small role in the Smokey Bear story. As Director, Wildlife Management, Forest Service, U.S. Department of Agriculture, I participated in negotiations with Elliott Barker, Chief Game Warden, New Mexico, in the arrangements to bring the cub to the National Zoo in 1950. Homer Pickens, assistant to Barker, accompanied Smokey, and stayed at my home.

Smokey was found in the Lincoln National Forest, and he became a symbol of fire prevention for the Forest Service, U.S.D.A.

—Lloyd W. Swift
Falls Church, VA

Smokey's successor, also called Smokey, came to the Zoo in 1974; Smokey continues to be a symbol of fire prevention for the U.S. Forest Service.

We like to hear from you. Send your letters to: Letters Editor, ZooGoer, FONZ Publications, National Zoological Park, Washington, D.C. 20008. Published letters may be edited for brevity.

Margaret Mee: In Search of Flowers of the Amazon Forests. 1988. Margaret Mee. Nonesuch Expeditions Ltd., Suffolk, England. 302 pp. hardbound, $45.00.

If thoughts of canoeing up the River Negro, trekking through thick Brazilian rainforests, or searching for luscious flora in Amazonia stir the explorer within you, then *Margaret Mee: In Search of Flowers of the Amazon Forests* may answer your call for adventure. Filled with Mee's critically acclaimed paintings and sketches of Amazonian flora, accompanied by diary excerpts and breathtaking photographs of South America, this book chronicles her travels through dense tropical rainforests and her efforts to prevent forest destruction.

Recognized as a skilled painter and political activist in her youth, Mee did not begin her search for rare and magnificent flora until she moved to Brazil in 1952 at the age of 43. In Sao Paulo, she taught art at a British school.

Then, in 1956, a vacation led Mee to the River Gurupi. Here she embarked on the first of 15 journeys documenting the indigenous peoples and wildlife of the rainforests. In the wilds of Amazonia her artistry flourished. During her 36 years in Brazil, Mee produced 400 compositions, 15 diaries, and 25 sketchbooks. Exhibited in both London and Brazil, her paintings won the praise of scientists and art critics alike for their exacting detail and brilliant color.

Mee's journal entries reveal the highlights and difficulties she faced on her expeditions. Though plagued with outbreaks of malaria, hoards of tiny immature ticks, and conflicts with aggressive *garimpeiros*, gold and gem washers who work along the rivers, Mee also breathed "the perfume of the jungle and the pure air of the river." These vivid journals, effectively blended with her later insights, draw the reader into the rainforests with her.

Over the course of her many journeys, Mee saw the forests she had grown to love and respect start to disappear as humans ravaged the landscape. The rapidly growing mining industry cleared not only the trees, but also the nutrient-rich topsoil. Mee witnessed bountiful Lake Batata become a "red-brown lake of sludge."

Once again, the activist within Mee responded and she appeared on Brazilian television to discuss the importance of vanishing rainforests and the resulting threat to many already endangered species. These appearances attracted the attention of the rector of the Federal University of Rio, who invited Mee to stay at a medical field station near the River Trombetas. Here she saw more forest devastation and intensified her conservation campaign, bringing these problems to the attention of Rio newspapers, which often quoted her speeches. Her efforts ended abruptly, however, with her death in a car accident on November 30, 1988. She had just seen the publication of *In Search of Flowers of the Amazon Forests* and the completion of a painting exhibition in England.

Margaret Mee: In Search of the Flowers of the Amazon Forests chronicles journeys, reveals her scientific and artistic skills, and highlights the wonders of the forests she loved.

—*Melissa Thornley*

Sketch from Margaret Mee: In Search of Flowers of the Amazon Forests. *(©Nonesuch Expeditions)*

The Margaret Mee Amazon Trust Fund has been created to preserve an exceptionally fine collection of 60 of her paintings, together with the archive of her travels. It is hoped that these will be purchased and deposited at the Royal Botanic Gardens, Kew in England. The Trust also plans to commemorate Mee's achievements by creating a scholarship for talented young Brazilian botanical students. This initiative is designed to further the effective long-term study of Amazonian botany and ecology and to foster cultural relations between Brazil and Great Britain. For information write: Dr. Simon J. Mayo, Margaret Mee Amazon Trust, c/o Herbarium, Royal Botanic Gardens, Kew, Richmond, Surry TW9 3AE, UK.

Pumas in Patagonia

In the thick, sticky air of an early June day in Gainesville, Florida, we sorted through the winter storage boxes of wool socks and long underwear, down parkas and felt-lined boots. Sweating, we tried them all on, trying to decide how many layers to pack before heat prostration set in. It was hard to pack for mid-winter at the southern tip of South America while sweltering even in skimpy Florida clothing.

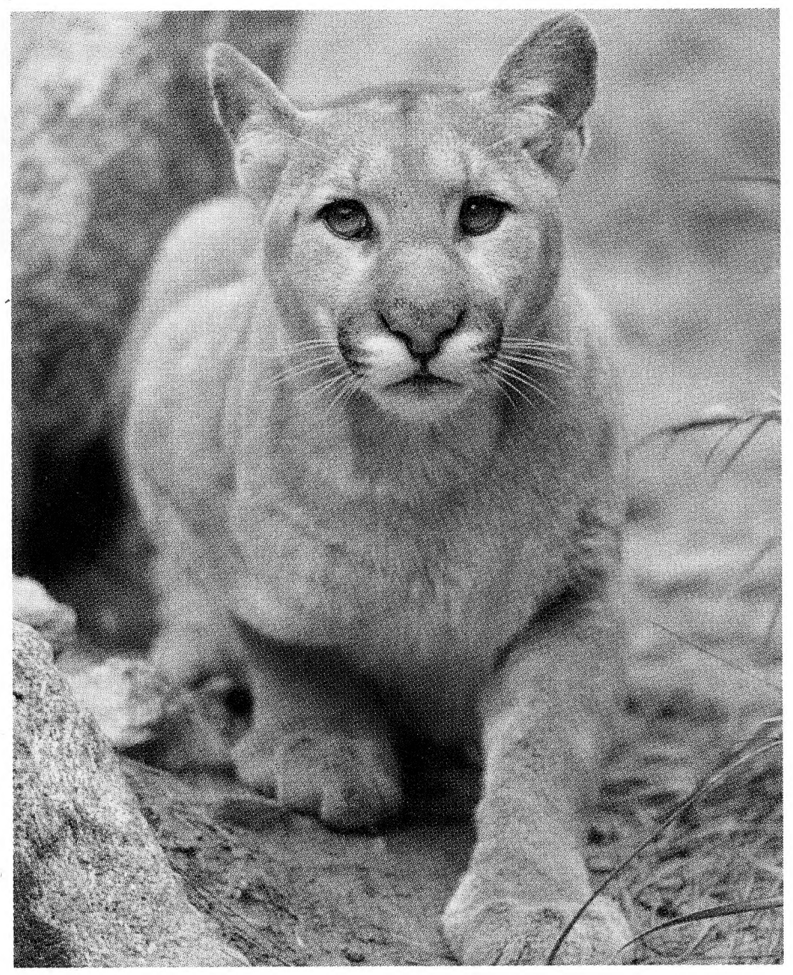
With my colleagues Vincent Gibaldi and Stephen Parker, I was preparing to travel to southern Chile's Torres del Paine National Park to join an Iowa State University research team on the snowy, windy steppes where the Andes meet the Strait of Magellan. With support from the National Geographic Society, Iowa State initiated a puma ecology study, known as "Proyecto Puma," in 1985. The 1989 season was to be the project's last year so we eagerly accepted the invitation of project leaders William Franklin and Warren Johnson to participate in their final capture effort. It would be an ideal opportunity to collect biological samples from wild Patagonian pumas—the most southerly subspecies of *Felis concolor*—to compare their reproductive and genetic traits with those of the endangered Florida panther.

Only 30 to 50 panthers survive in southern Florida and maintaining their genetic and reproductive vitality is one of the highest priorities of the Florida Game and Freshwater Fish Commission's (GFC) Florida Panther Recovery Project. Preliminary studies, carried out as a collaborative effort between David Wildt and Steven O'Brien of the National Zoo's Center for New Opportunities in Animal Health Sciences (NOAHS) and myself, suggest that the Florida panther's reproductive capabilities and genetic diversity are already compromised. But it is important to compare the Florida panther research results with data from healthy, outbred puma populations. Only by understanding the genetic diversity and reproductive health of robust populations can we appreciate the magnitude of the effects inbreeding has or will have on the future of the Florida panther.

So, with support from a grant to the NOAHS Center from the David Shepherd Conservation Foundation of England and from the GFC, we faced the challenges of field research in Patagonia. Spoiled by our access in Florida to electricity, cars, good roads, helicopters, and airplanes, as well as to research supplies such as oxygen, dry ice, and liquid nitrogen, we felt particularly hampered by the absense of such amenities in South America.

All of the medical and laboratory equipment we brought had to be transported by bus and taxi from Punta Arenas at the southern tip of Chile to the next largest town—about half-a-day's journey to the north. Once there, we laid in a two-week supply of groceries and gasoline, transferred food, trunks, and people into two tired old Land Rovers that kept trying to die, and headed out. A five-hour drive over the mud-slicked roads took us to the field camp at the base of the park's spectacular rock spires. After stoking wood fires, we sorted supplies and set up our lab by candlelight. Then we packed saddle bags with medical and capture equipment to be carried by horseback into the mountain retreats of the Patagonian pumas.

Despite the difficulties, in the next month we collected samples of blood, skin tissue, and semen from 16 different pumas. Some were from the wild Patagonian pumas, others were from wild-born animals of two other Chilean subspecies held in private and zoo collections in Punta Arenas and Santiago. The analysis of all the samples by GFC and NOAHS scientists is not yet complete but we hope that the results will lead to better long-range breeding and management plans for the Florida panther and, ultimately, to the subspecies' continued survival.



Puma at the National Zoo. (Photo by Jessie Cohen, NZP Graphics.)

This research—which is really just a small piece of the Florida panther project—required the cooperation of scientists from three U.S. institutions (GFC, NOAHS Center, and Iowa State University), as well as from Chilean government officials and private individuals. From Chile's National Forestry and Park Service (CONAF) to a military base with its mascot puma, "Lautaro," from the staff of the zoo in Santiago to the owners of captive pumas who allowed us access to the animals, all were essential to the study's success. This is an example of the type of multi-agency, multi-national cooperation that is critical to the conservation of wild animals. As the world's wildlife habitats continue to be degraded by human activities and more and more animal populations become fragmented, their reproductive and genetic integrity threatened, the need to foster such international efforts becomes ever more imperative.

—Melody E. Roelke
Veterinarian
Florida Game and
Freshwater Fish Commission

Friends of the National Zoo
National Zoological Park
Washington, D.C. 20008

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